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(12) **United States Patent**  
**Hair, III et al.**

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(54) **OPTICAL VEND-SENSING SYSTEM FOR CONTROL OF VENDING MACHINE**

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(\*) **Notice:** This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(57) **ABSTRACT**

For ensuring that a vending machine motor will continue to operate until a product has descended through a vending space or an established time interval has elapsed, an optical beam is established across the vend space through which a product must drop. A change in beam intensity is detected. By preference infra red light is emitted at one focal point of an elliptical reflector, and detected at the other focal point. The light is emitted in pulses in the preferred embodiment, and the optical sensing system has automated calibration and error detecting functions.

**51 Claims, 16 Drawing Sheets**

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#### Related U.S. Application Data

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**G06M 7/00**; **G07F 11/00**

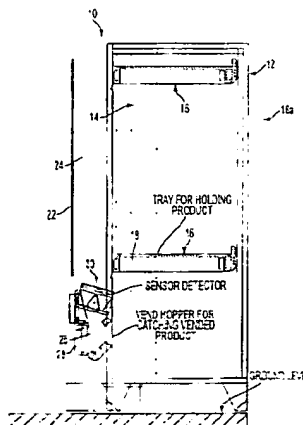
(52) **U.S. Cl.** ..... **250/223 R**; **250/216**; **250/221**;  
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(58) **Field of Search** ..... **250/216**, **221**,  
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(12) **United States Patent**  
Pollock et al.

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(54) **SYSTEM AND METHOD FOR PERFORMING VEND OPERATION**

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(52) U.S. Cl. .... **221/1; 221/75**

(58) Field of Search ..... **221/1, 75, 7, 9,**  
**221/15, 88, 277, 195, 196, 289**

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## (57) ABSTRACT

A method and system are provided for performing vend operations on articles selected by a purchaser. Articles to be dispensed are stored in a storage section, and purchased articles are transferred from the storage section to a vend section. A vend mechanism is provided for rapidly moving a given article from a vend-destined section to the vend section. A helical transfer member holds the articles in the storage section and is rotatable in a dispensing direction to transfer the given article from a position adjacent the vend-destined section to the vend-destined section. The helical transfer member is also rotatable in a reverse direction opposite the dispensing direction. A driver is coupled to each helical transfer member, and is actuable to rotate the helical transfer member in either the dispensing direction or the reverse direction. A controller is operable during each vend operation to control the driver to first rotate the helical transfer member in the dispensing direction by a first amount until the given article is fully transferred to the vend-destined section. The controller then controls the driver to then rotate the helical transfer member in the reverse direction by a second amount until an article immediately following the given article is securely held in the storage section.

**36 Claims, 10 Drawing Sheets**

